

# **SECURITY SYSTEM FOR A BUILDING**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

The present invention relates to a security system, and more particularly to a security system that assists a person to easily handle all situations, moreover the security system also prevents the occurrence of false alarms.

### **2. Description of Related Art**

Household security systems commonly use infrared or ultrasonic sensors to detect whether any moving object has entered the detecting area of the sensor. When such detection occurs, the security system will automatically generate alarming sounds or other warning signals. Such a household security system is usually activated when the occupants leave their houses.

However, a serious drawback to such security devices is the occurrence of false alarms. Especially for the families keeping pets, false alarms may possibly occur because of the pets such as cats or dogs moving around the home. In another situation, if people forget to deactivate the security device first when they enter the house, a false alarm will occur. Furthermore, the complex arrangement of the signal wires of the security sensors inside the house is another problem that bothers people.

Therefore, there is a desire to have a superior security system to obviate the aforementioned drawbacks.

## **SUMMARY OF THE INVENTION**

The main objective of the present invention is to provide a security device that assists the users to handle inside situations and prevents the possible

1 occurrence of false alarms.

2 Other objects, advantages and novel features of the invention will  
3 become more apparent from the following detailed description when taken in  
4 conjunction with the accompanying drawings.

#### 5 BRIEF DESCRIPTION OF THE DRAWINGS

6 Fig. 1 is a block diagram of a first embodiment of a security system in  
7 accordance with the present invention; and

8 Fig. 2 is a block diagram of a second embodiment of a security system in  
9 accordance with the present invention.

#### 10 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

11 With reference to Fig. 1, a first embodiment of the security system is  
12 composed of multiple sensors (10), image capturing devices (20), a control unit  
13 (30), a communication interface (30), an alarming device (32) and other  
14 components. The multiple sensors (10) are installed at different places inside a  
15 house to monitor the indoor conditions. These sensors (10) may be chosen from  
16 infrared sensors, ultrasonic sensors, charge couple device (CCD) cameras or  
17 CMOS cameras. In the embodiment, ultrasonic sensors with memory equipped  
18 therein are adopted as an example.

19 The installation positions for the image capturing devices (20), which  
20 may be CCD cameras or CMOS cameras, are respectively located at the places  
21 where the sensors (10) are installed, whereby each image capture device (20) is  
22 responsible for a specific region where a respective sensor (10) monitors.

23 The control unit (30) is able to selectively connect to the Internet or a  
24 mobile telecommunication network through the communication interface (31) so

1 that the captured images can be transmitted to a cell phone of the house-owner  
2 via the mobile telecommunication network, or to a police department or a  
3 security service firm via the Internet.

4 The alarming device (32) is activated by the control unit (30) to generate  
5 alerting signals.

6 The connection among the control unit (30), image capture devices (20)  
7 and sensors (10) is implemented by power lines shown in Fig. 1. It is noted that  
8 the control unit (30), each sensor (10) and each image capturing device (20) are  
9 connected to the power lines via a respective power line carrier (40). The power  
10 line carriers (40) are provided to modulate and demodulate data intended to be  
11 transmitted over these power lines so that data can be bi-directionally  
12 transmitted between the control unit (30) and the sensor (10) or image capture  
13 device (20).

14 With reference to Fig. 2, the second embodiment is similar to the first  
15 embodiment of Fig. 1. The difference is that the connection among the control  
16 unit (30), image capture devices (20) and sensors (10) is implemented by  
17 wireless communication instead of the power lines. Multiple radio signal  
18 transceivers (50) are connected to the sensors (10), the image capture devices (20)  
19 and the control unit (30) for receiving and transmitting data.

20 When the house-owner leaves the building and activates the security  
21 system, each sensor (10) firstly records the initial environment condition as a  
22 default status and then stores the default status to the control unit (30). During  
23 the guarding period of the security system, each sensor (10) will continuously  
24 monitor the surrounding status and compare the monitored data to the default

1 status. Once the environment status has changed,e.g. there may be moving  
2 objects in the house, the sensor (10) will output a signal to inform the control unit  
3 (30) thereby activating a corresponding image capture device (30) to take  
4 pictures. These captured pictures are further transmitted to the house-owner's  
5 cell phone through the communication interface (31) and the mobile  
6 telecommunication network.

7       Based on the images displayed on the cell phone, the house-owner can  
8 recognize whether any unauthorized person has entered the building. If  
9 necessary, the house-owner can directly call the police or send a command back  
10 to the control unit (30) to activate the alarm (32) and transmit an emergency  
11 notification to the security service firm via the Internet.

12       Occasionally, the house-owner will receive the alarm notification from  
13 the control unit (30) although no one has entered the house; such a situation may  
14 take place when there are pets inside the house. The house-owner can utilize the  
15 cell phone to send a renew command to the control unit (30) thus activating all  
16 sensors (10) to re-monitor the present inside status and updating the stored  
17 default status.

18       Moreover, if the situation inside the house is not able to be fully  
19 determined, the house-owner can send a command through the use of the cell  
20 phone to activate the image capture devices (20) so as to acquire more pictures.

21       To monitor the environmental situation, ultrasonic sensors (10) are  
22 activated to emit ultrasonic signals and receive the reflected signals. The  
23 reflected signals are converted to digital signals and then stored in the memories  
24 equipped inside the sensors (10) as the default values. The subsequent measured

1 environment values will be compared to the default values. Once the result of the  
2 comparison shows the environment situation has changed, the sensor (10) will  
3 output a signal to inform the control unit (30). Because all the ultrasonic sensors  
4 (10) are capable of memorizing the environment situation, they can be installed  
5 at any place inside the housing without concern of the furniture arrangement.

6 The ultrasonic sensors may cause false alarms because of tiny changes in  
7 the environment, for example, the emitted ultrasonic signals are reflected by  
8 insects. Therefore, in order to avoid the false alarms, the threshold value for the  
9 reflected signals is adjustable. Only when the reflected signals exceed the  
10 threshold value will the control unit (30) send captured images to the cell phone.

11 As mentioned above, the interconnection between the control unit (30)  
12 and the sensors (10) is implemented by power lines or wireless communication  
13 technique. When using the power lines, these power line carriers (40) modulate  
14 the signals output from the sensors (10) and transmit these modulated signals  
15 over the power lines to the control unit (30), meanwhile the signals from the  
16 control unit (30) can be demodulated. Similarly, when using the wireless  
17 technique, signals from the sensors (10) are modulated to high frequency signals  
18 and then transmitted to the control unit (30).

19 When the power lines are used as the signal transmission media, the  
20 sensors (10) can be directly installed into outlets fitted in the walls. On the other  
21 hand, when the signal transmission is performed by wireless communication,  
22 there is no positional limitation to the sensors (10).

23 Further, the image capture device (20) can be installed at any desired  
24 position, even on the outlets in the wall.

1           Since the CCD and CMOS cameras are capable of storing the  
2 environment situation, the aforementioned ultrasonic sensors can be replaced  
3 with these cameras as the sensors (10). However, the high resolution of the CCD  
4 or CMOS cameras may easily result in false alarms.

5           The emergency telephone number, such as 911 or the phone number of  
6 the security service firm, and the cell phone number of the house-owner, can be  
7 stored in the control unit (30), whereby the control unit (30) is able to dial a  
8 proper number set.

9           In conclusion, the functions served by the control unit (30) include:

- 10           a. communicating, transmitting and receiving signals among all  
11 elements;
- 12           b. automatically dialing the police or security service firm to deliver a  
13 warning message;
- 14           c. sending the captured images to a user's cell phone; and
- 15           d. receiving the commands from the cell phone and based on these  
16 received commands, controlling other elements.

17           It is to be understood, however, that even though numerous  
18 characteristics and advantages of the present invention have been set forth in the  
19 foregoing description, together with details of the structure and function of the  
20 invention, the disclosure is illustrative only, and changes may be made in detail,  
21 especially in matters of shape, size, and arrangement of parts within the  
22 principles of the invention to the full extent indicated by the broad general  
23 meaning of the terms in which the appended claims are expressed.